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Indian Standard

TEST CHART FOR SHAPING MACHINES

(First Revision)

भारतीय मानक

शेपिंग मशीनों के परीक्षण चार्ट

(पहला पुनरीक्षण)

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Machine Tool Basics and Modular Units Sectional Committee, PE 03

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 5 September 1989 after the draft finalized by Machine Tool Basics and Modular Units Sectional Committee had been approved by the Production Engineering Division Council.

This standard was first issued in 1963. This revision has been taken up to correlate the test methods as per IS 2063 : 1962.

Indian Standard
TEST CHART FOR SHAPING MACHINES
(First Revision)

1 SCOPE

1.1 This standard describes both geometrical and practical tests on shaping machine and the corresponding deviations with reference to IS 2063 : 1962.

1.2 It deals with only the verification of accuracies and applies neither to the testing of the running of the machine (vibrations, abnormal noises, stick-slip motion of components, etc) nor to the machine specifications (speeds/feeds, etc).

2 REFERENCES

IS 2063 : 1962 'Code for testing machine tools' is a necessary adjunct to this standard.

3 PRELIMINARY REMARKS

3.1 To apply these tests, reference shall be made to IS 2063 : 1962 especially for installation of the machine before testing, warming of spindles and other parts, description of measuring methods and recommended accuracy of testing instruments and equipments.

3.2 The sequence in which the geometrical tests are given is related to unit and other sub-assemblies of the machine and does not specify the order in which the tests are to be carried out.

The sequence of carrying out the tests may be changed to suit ease of mounting of measuring and testing equipments.

3.3 It is necessary while inspecting the machine to carry out all the tests described in this standard; excepting those tests which may be omitted in mutual agreement between the buyer and the manufacturer.

3.4 Practical tests shall be carried out only with finishing cuts and not with roughing cuts which are liable to generate appreciable cutting forces.

The details of test pieces, cutting and test conditions shall be specified by the manufacturer.

3.5 When establishing the tolerance for a measuring range different from that indicated in this standard (*see* **2.3.1.1** of IS 2063), it shall be taken into consideration that minimum tolerance is 0·01 mm. For any proportional value, that calculated value shall be rounded off to the nearest 0·005 mm. However, the least count of measuring instruments need not be finer than 0·01 mm.

3.6 Wherever alternate methods of testing are suggested, the choice of actual methods of testing is left to the manufacturer.

3.7 For the purpose of this standard, various methods of expressing permissible deviation are used and each is having a particular type of application. Following methods are employed:

a) 000/000 for deviations of perpendicularity which are ratios.

b) 000 for any length of 000 for deviations of straightness and parallelism, the expression is used for local permissible deviations, the measuring length being obligatory.

c) 000 for 000 for deviations of straightness and parallelism, this expression is used to recommend a measuring length, but in this case the proportionality rule comes into operation, if the measuring length differs from those indicated.

4 TESTING INSTRUMENTS

The testing instruments shall be of approved type and shall be calibrated at a recognized temperature; conforming to relevant Indian Standards.

5 ACCURACY REQUIREMENT

The tests to be carried out, the maximum permissible errors, the instruments required and the manner in which the tests are to be carried out shall be detailed as in the test chart.

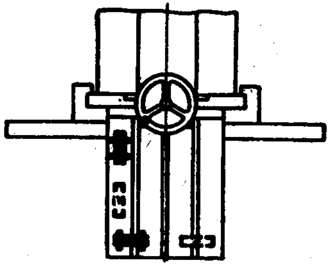
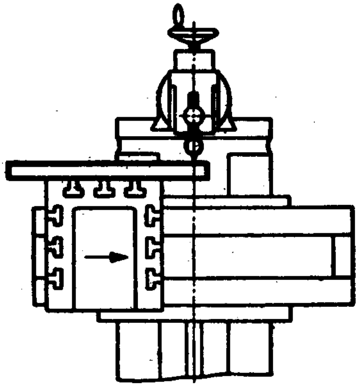
NOTE — The illustrative diagrams in this standard are only for reference.

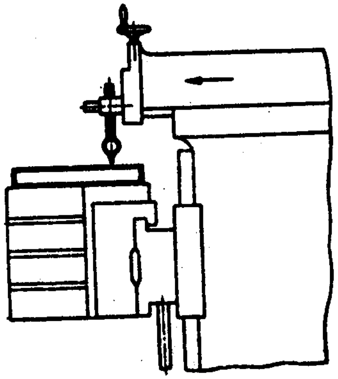
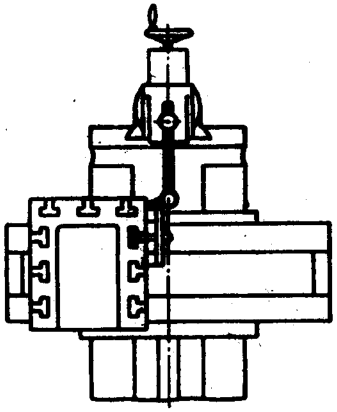
Test Chart for Shaping Machines

Type........................ Customer.....................

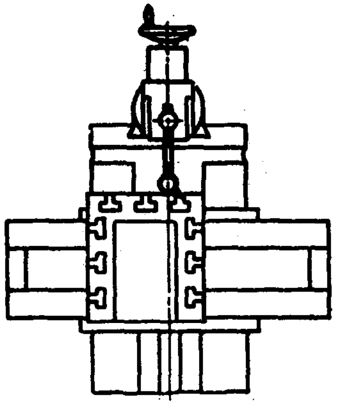
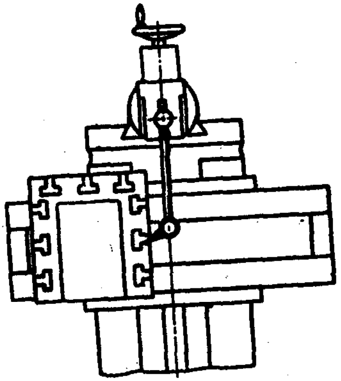
Machine No. .... Order No. ....Date............ .. Inspector.......................

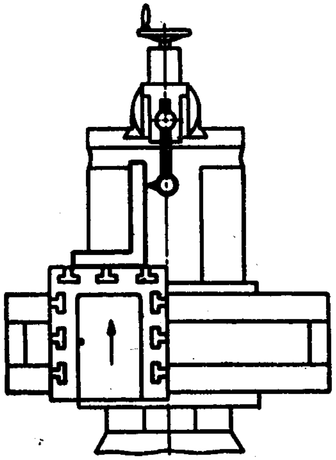
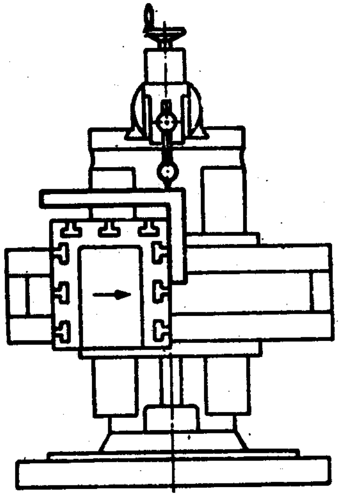
I. GEOMETRICAL TESTS

Sl No.	Figure	Object	Measuring Instruments	Reference to IS 2063 and/or Instructions for Testing	Permissible Deviations mm	Actual Error
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1		Measurement of flatness of table top face.	Spirit level and gauge blocks.	**5.2, 5.2.2.3** Set the table in the central position. Place spirit level on top face on gauge blocks. Readings shall be recorded in longitudinal and transverse directions at various positions. (Note: Maximum distance between two successive positions of level shall be between 150 to 300, according to the area of top face).	0·04 for 1 000. Top face shall be concave only.	
2		Measurement of parallelism of table top face to its transverse movement.	Straight edge, dial gauge.	**5.3.2, 5.3.2.2** (a) (1) Set the straight edge in the direction of transverse movement. Mount the dial gauge on the ram. Move the table in the transverse direction. Note the readings of dial gauge. NOTE — The straight edge shall be placed at minimum 3 positions on the table top face (that is, two ends and centre) and readings noted.	(i) 0·02 for 300. (ii) Maximum 0·04 over entire movement of table.	

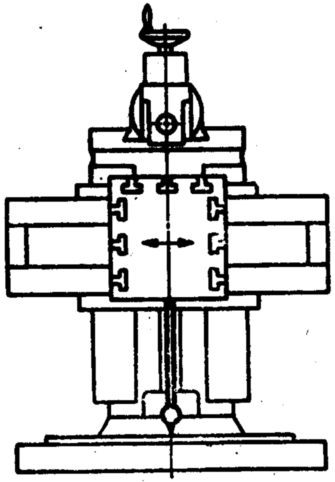
3		Measurement of parallelism of table top face to the ram movement.	Straight edge and dial gauge.	**5.3.2, 5.3.2.2** (a) (2) Set the table in the central position and ram to the end of the stroke position. Mount straight edge on the table top-face in the direction of movement of ram alternatively on the left and right sides of table. Mount dial gauge on the ram. Move the ram and note the readings.	(i) 0·02 per 300. (ii) Maximum 0·04 over the entire length of table. Table shall rise towards free end only.	
4		Measurement of parallelism of table side face to the movement of ram.	Dial gauge.	**5.3.2, 5.3.2.2** (a) (2) Mount the dial gauge on the ram. Move the ram through the length of table by hand. Note the reading on dial gauge. Readings shall be recorded at 3 position - 2 ends and centre. Repeat the process for other side.	0·03 per 300. Maximum 0·05 on entire length of table.	

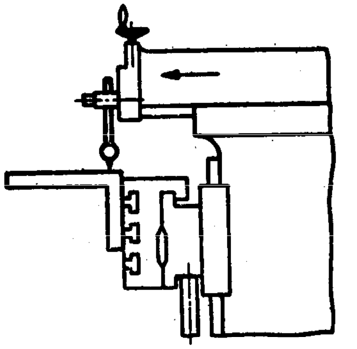
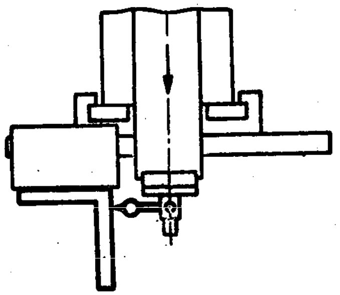
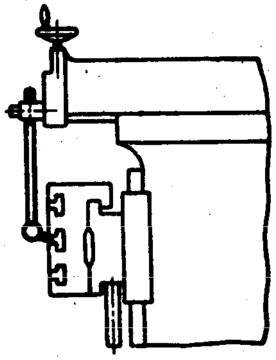
Test Chart for Shaping Machines (*Contd*)

Sl No.	Figure	Object	Measuring Instruments	Reference to IS 2063 and/or Instructions for Testing	Permissible Deviations mm	Actual Error
(1)	(2)	(3)	(4)	(5)	(6)	(7)
5		Measurement of parallelism of reference 'T' slot on top face to the movement of ram.	Dial gauge.	**5.3.2, 5.3.2.2** (a) (2) Set the dial gauge on the ram and measure the readings by moving the ram slowly through entire stroke length.	0·02 per 300. Maximum 0·04.	
6		Measurement of parallelism of reference 'T' slot on side faces - to the movement of ram. (Only for Tables with horizontal slots).	Dial gauge.	**5.3.2, 5.3.2.2** (b) Set the dial gauge on the ram and note the readings by moving ram slowly and through entire length.	0·03 per 300. Maximum 0·06. The slots to rise towards free end of table only.	

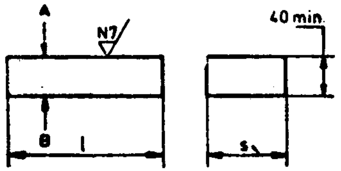
7		Measurement of squareness of table top face to its vertical movement. (As well as to vertical travel of tool slide).	Dial gauge and square.	**5.4.2** and **5.4.2.2** Bring the table to its lower most position. Mount dial gauge on ram. Set the square on the top face. (i) Move the table in vertical direction and note the dial gauge readings. (ii) Move the tool post by hand in vertical direction down and then up. Note the reading on dial gauge.	0·02 per 300. Maximum 0·05.	
8		Measurement of squareness of side faces of table to its transverse movement.	Dial gauge and square.	**5.4.1.1** (b) (5) (i) Set square on one of the side faces. Set dial gauge on ram and move the table in transverse direction. Note the dial gauge reading. (ii) Repeat the procedure for other face.	0·03 per 300. Maximum 0·06.	

Test Chart for Shaping Machines (*Contd*)

Sl No.	Figure	Object	Measuring Instruments	Reference to IS 2063 and/or Instruments for Testing	Permissible Deviations mm	Actual Error
(1)	(2)	(3)	(4)	(5)	(6)	(7)
9		Measurement of parallelism of guideways for table support to the transverse movement of table. (Test shall be applicable to machines with table support).	Dial gauge and square.	**5.3.2, 5.3.2.2** (a) (1) Set the dial gauge on table bottom and/or front face. Remove table support. Move the table in the transverse direction and note the dial gauge reading.	0·03 per 300. Maximum 0·06.	

10	 	Measurement of squareness of table fixing face to the ram movement. (For machines with detachable tables only). a) In vertical plane b) In the horizontal plane.	(a and b) Dial gauge and square.	**5.4.1.1** (3) (i) a) Set the square on the fixing face, set dial gauge on the ram. Move the ram. Note the dial gauge readings. b) Set the square on the fixing side face, set dial gauge. Move the ram and note the dial gauge readings.	a) 0·02 per 300, measuring ram of square to rise towards the free end only. b) 0·03 per 300.	
11		Measurement of parallelism of 'T' slot in table carriage to its transverse movements. (For machines with detachable tables only).	Dial gauge	**5.3.2.2** (b) Set the dial gauge on ram and engage pointer vertically on 'T' slot. Move table carriage and note the dial gauge readings. (If 'T' slots are not provided, locating face shall be checked.	0·03 per 300. Maximum 0·04.	

II. PRACTICAL TEST

Sl No.	Figure	Object	Measuring Instruments	Reference to IS 2063 and/or Instructions for Testing	Permissible Deviations mm	Actual Error
(1)	(2)	(3)	(4)	(5)	(6)	(7)
12	 $l \simeq \frac{2}{3}$ Maximum Stroke $3 \simeq \frac{2}{3}$ Maximum Table Width	Measurement of parallelism of machined surface A to the bearing surface B.		(i) The bottom face 'B' shall be properly machined; if necessary shall be scraped. Machined face A with finishing cut. Note Readings with micrometers at several points along length and width of work piece.	0·03 per 300.	

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